A new genus to accommodate three skinks currently assigned to *Proablepharus* (Lacertilia: Scincidae)

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ABSTRACT

The genus *Proablepharus* currently contains five species (*P. barrylyoni, P. kinghorni, P. naranjicaudus, P. reginae* and *P. tenuis*). Morphologically, these are readily separated into two groups: the small, almost patternless species (*P. reginae* and *P. tenuis)* and the larger, striped species (*P. kinghorni, P. barrylyoni* and *P. naranjicaudus*). We present genetic and morphological data to demonstrate that these two groups are generically distinct from each other. As *P. reginae* is the type species for *Proablepharus*, we erect a new genus, *Austroablepharus* gen. nov., for the *kinghorni* group and designate *A. kinghorni* as the type species. ❐ *Proablepharus, Austroablepharus gen. nov., Australia, morphology, genetics.*

The genus *Proablepharus* was erected by Fuhn (1969) in a revision of skinks assigned to *Ablepharus* Fitzinger 1823. Fuhn (1969) separated *A. reginae* Glauert 1960 and *A. tenuis* Broom 1896 into *Proablepharus* which he defined by the following traits: 'pentadactyle; no supranasals; frontoparietals paired; interparietal present'. Fuhn failed to designate a type species for the genus. Greer (1974) considered *Proablepharus* as containing three species: *P. reginae*, *P. davisi* (Copland 1952) and *P. kinghorni* (Copland 1947), and designated *Proablepharus reginae* as the type-species. He left *Ablepharus tenuis* and *Ablepharus broomensis* Lönnberg & Andersson 1913 as species *incertae sedis* (i.e., unassigned) pending the opportunity to examine a palatal feature of their skulls. Greer (1974) diagnosed *Proablepharus* as: 'Small (snout-vent length 45 mm or less), terrestrial skinks which lack supranasals, possess an ablepharine eye and have the interparietal distinct from the frontoparietal(s). Frontoparietals distinct (*reginae*) or fused (*kinghorni* and *davisi*); frontal in contact with 2 of 4 supraoculars (*reginae* and *kinghorni*) or 1 of 3 supraoculars (*davisi*).' Storr (1975), in discussing the two Western Australian species, recognised *P. reginae* and *P. tenuis*, and placed *broomensis* and *davisi* in the synonymy of *P. tenuis*. This left *Proablepharus*

FIG. 1. *Proablepharus reginae* showing a drab brown, relatively uniform pattern; Tennant Creek, Northern Territory (Image: Steve Wilson).

FIG. 2. *Austroablepharus kinghorni*, type species for the genus, with characteristic stripes and an orange tail; Durham Downs, Queensland (Image: Steve Wilson).

as containing three species: *P. reginae, P. tenuis* and *P. kinghorni*.

An additional two species, *P. naranjicaudus* Greer, Fisher & Horner 2004 and *P. barrylyoni* Couper, Limpus, McDonald and Amey 2010 have since been described and *Proablepharus* is currently recognised as a genus of five species (Cogger 2014, Wilson & Swan 2010). In appearance, these are easily separated into two groups: the small drab, practically patternless species (*P. reginae*, Fig. 1; *P. tenuis*) and the larger, distinctively striped species (*P. kinghorni*, Fig. 2; *P. barrylyoni, P. naranjicaudus*). Using both genetic and morphological data, we herein recognise these two groups as generically distinct. *Proablepharus reginae* is the type species for the small, patternless group and we here describe the large, striped group as a new genus, *Austroablepharus*, with *A. kinghorni* as the type species.

METHODS AND RESULTS

Genetic data. The phylogeny presented herein comes from a current analysis of exon data across Australian eugongylid skinks (Bragg *et al.*, in prep.). Here we just present a summary of the methods and results for the clade containing skinks currently assigned to *Proablepharus*. The tree presented (Fig. 3) is a concatenated phylogeny based on 1107314 base pairs of unphased exon nDNA data across 115 individuals of the species listed (with less than <10% missing data among species). The method for gathering the exon data, in-solution exon capture, is described in Bragg *et al.* (2016). The tree is constructed using a maximum likelihood approach in RAxML (8.2.3, Stamatakis 2014) based on the rapid bootstrap algorithm, a random starting tree, the GTRGAMMA model and 100 bootstrap replicates. In addition, a summary multispecies coalescent analysis using ASTRAL-II (4.7.9, Mirarab & Warnow 2015) supported the same nodes with 100% support, based on maximum likelihood gene trees also run in RAxML.

The phylogeny contains *P. reginae* (n = 8), *P. tenuis* (n = 26) and *P. kinghorni* (n = 4), but does not contain *P. naranjicaudus* and *P. barrylyoni* because tissue samples are not available for these two species. Our analyses of the genetic data retrieved a scheme of relationships in which the three species sampled were not monophyletic. *Proablepharus kinghorni* is more closely related to *Acritoscincus* and *Morethia* than it is to the clade containing *P. reginae* and *P. tenuis*. Support values for these relationships are very high, in all cases being 100% support from multispecies coalescent analysis and maximum likelihood (Fig. 3). The relationships shown here are supported by the broader species tree analysis across the Australian eugongylid skinks (Bragg *et al.*, in prep.).

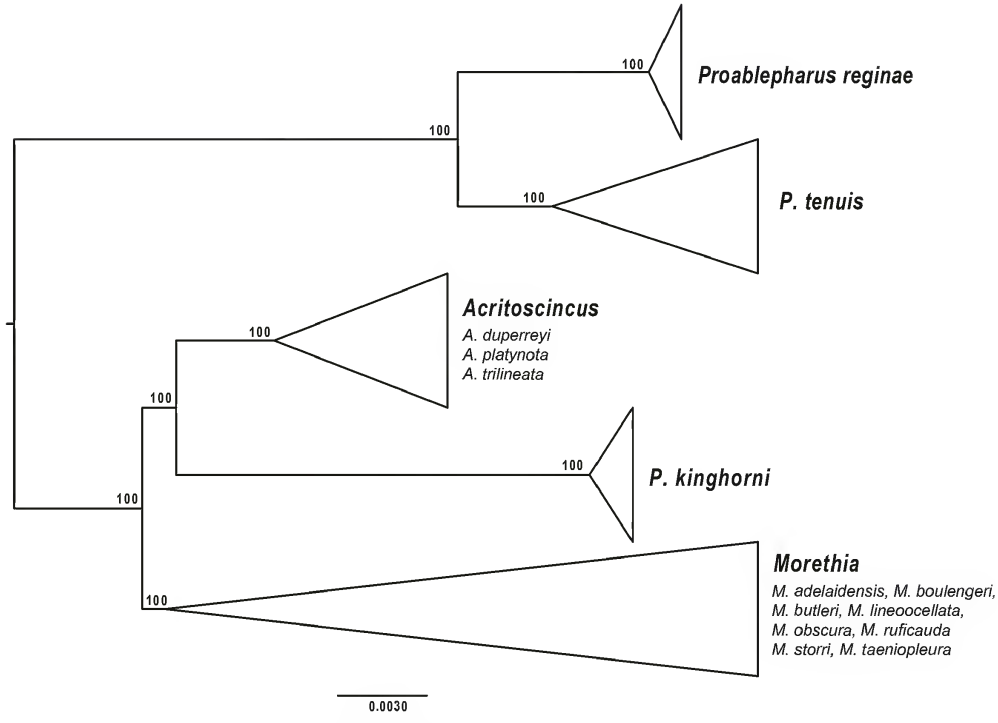

FIG. 3. An exon nDNA phylogeny of the eugongylid clade containing *P. reginae*, *P. tenuis* and *P. kinghorni* (now *Austroablepharus kinghorni*) and allied skink genera. See text for details on data and analysis.

Morphological data. The '*kinghorni* group' are most readily separated from *Proablepharus* by their larger size (SVL 45–51 mm *vs* 32–41 mm), a tendency for fewer midbody scale rows (20–24 *vs* 22–28), elevated paravertebral scale and presacral vertebrae counts (55–67 *vs* 52–57 paravertebrals; 30–36 *vs* 27–31 presacrals), fused frontoparietals (*vs* divided in *P. reginae* and *P. tenuis*, although the latter can occasionally also have a partly or fully fused condition), and keeled or mucronate subdigital lamellae (for *kinghorni* and *naranjicaudus vs* not keeled in *P. reginae* and *P. tenuis*) (Table 1). There are also distinct pattern differences, with adults of the '*kinghorni* group' exhibiting dark longitudinal stripes (present but less distinct in large, duller specimens) *vs* adult *P. reginae* and *P. tenuis* drab and practically patternless, and adults of the '*kinghorni* group' having obvious red/orange tail pigmentation (*vs* brown in adult *P. reginae* and *P. tenuis*; these two species have red tails as juveniles but the colour is lost with age; Greer 1980) (Table 1).

Assertions below regarding the polarity of the morphological characters uniting the '*kinghorni* group' follow Fuhn (1969) and Greer (1979, 1983). The fused frontoparietals in the '*kinghorni* group' are interpreted as a derived character state (Greer 1979), as are the keeled or mucronate (i.e., ending in a short sharp point) state of the subdigital lamellae (Greer 1979) in *kinghorni* and *naranjicaudus*. The polarity of the lamellae condition of *barrylyoni* is at this time unclear until the phylogenetic relationships among members of the '*kinghorni* group' are resolved. The modal (and primitive) number of presacral vertebrae for skinks with well-developed limbs is 26 (Hoffstetter & Gasc 1969; Greer 1983). Upward shifts from this state, marked by a reduction in limb length relative to body length, are considered progressive derivations (Greer 1983). Hence, the condition is derived for both *Proablepharus* and the

TABLE 1. Characters separating the small brown *Proablepharus* spp. from the larger, striped *Austroablepharus* species.

Character	*Proablepharus reginae*	*Proablepharus tenuis*	*Austroablepharus kinghorni*	*Austroablepharus barrylyoni*	*Austroablepharus naranjicaudus*
SVL (mm)	41	32	45	51	46
Presacral vertebrae	27–31	28-31	31–33	32–36	30–33
Paravertebral scales	52–57	53	55–64	58–67	58–64
Midbody scale rows	24–28	22–26	20–22	21–22	21–24
Frontoparietals	divided	divided, partially or fully fused	fused	fused	fused
Subdigital lamellae	not keeled	not keeled	finely keeled	not keeled	mucronate
pattern	plain	plain	striped	striped	Striped
Position of dark pigment on body scales	central	central	lateral edges	lateral edges	lateral edges
Adult breeding male tail colour	brown	brown	orange flush	orange flush	orange flush

'*kinghorni* group' but more so in the latter, more elongate, genus.

The differences in morphology between *Proablepharus* (*P. reginae, P. tenuis*) and the larger, striped species of the '*kinghorni* group' (*kinghorni, barrylyoni, naranjicaudus*) are supported by the genetic groupings retrieved, at least to the extent of the species included in the genetic study. The '*kinghorni* group' is distinguished from its sister genus, *Acritoscincus*, by the condition of the lower eyelid: immovable (preablepharine) *vs* movable. It is distinguished from *Morethia*, its next closest relative, by the condition of the supraocular/supraciliary contact: the primitive condition in the '*kinghorni* group' where the supraciliaries form a relatively straight-edged line of contact with the supraoculars *vs* a derived modal condition in *Morethia* where the supraciliaries are interdigitated with the supraoculars (Greer 1980). The species in the '*kinghorni* group' are more elongate than *Morethia*, as expressed by the higher number of presacral vertebrae (30-36 *vs* 27-31; data from Greer 2007) and hence this is regarded as a derived character state that distinguishes the '*kinghorni* group' from *Morethia*.

NEW GENUS

Austroablepharus gen. nov.

Suggested common name. Grassland Striped Skinks.

Type species. *Austroablepharus kinghorni* (Copeland, 1947)

Species. *A. kinghorni* (Copland 1947), *A. naranjicaudus* (Greer, Fisher & Horner 2004), *A. barrylyoni* (Couper, Limpus, McDonald & Amey 2010).

Etymology. Austro for Australia and ablepharus referring to an immovable lower eyelid that is partially fused to the upper eyelid to form a permanent spectacle.

Diagnosis. A genus of small skinks (adult SVL ≤ 51mm) with pentadactyl limbs, ≤ 24 midbody scale rows, ≥ 55 paravertebral scales, and ≥ 30 presacral vertebrae. Limbs narrowly to widely separated when adpressed. Supranasals absent and nasals undivided; prefrontals large, in contact or narrowly separated; eye moderate-sized with lower eyelid immovable, partially fused to upper eyelid to form a permanent spectacle but with a distinct slit between the lower eyelid and the supraciliaries (preablepharine); frontoparietals fused; interparietal free or fused; ear opening very small; parietals in contact; body pattern consisting of alternating

pale and dark stripes (each dorsal body scale with a pale centre and dark lateral edges); adult tail colouration red/orange.

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